Contour segments and tones in phase-based Agreement by Correspondence

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Phonological theory has long been challenged by the behavior of contour segments and contour tones in harmony patterns. Sometimes these entities participate in phonology as whole units; at other times, their subsegmental parts act independently. This paper builds on insights from Autosegmental Theory (Goldsmith 1976), Aperture Theory (Steriade 1993), and Articulatory Phonology (Browman and Goldstein 1989; Gafos 2002) to propose a novel phonological representation for segments: all segments, including contours, are subdivided into a maximum of three ordered subsegmental phases that host unitary sets of distinctive features and can participate in harmony (and other processes). These phases, shown with superscript numbers in (1), correlate with closure, target, and release phases in consonants and CV/VC transitions and targets in vowels.

(1) Vowel with triple tone contour $V(à^1\ á^2\ à^3)$ e.g., Mende *mbà^* 'companion'
    Pre- and post-aspirated plosive $C(h^1\ k^2\ h^3)$ e.g., Kashaya $^h k^h uy$ 'burn' (Buckley 1992)
    Prenasalized consonant $C(n^1\ d^2\ d^3)$ e.g., $^n d$
    Aspirated affricate $C(t^1\ ʃ^2\ h^3)$ e.g., $ʧ^h$ (see (2b) below)

By incorporating these representations in Agreement by Correspondence (ABC; Hansson 2001; Rose and Walker 2004; a.o. for segmental ABC; Shih 2013 for tonal ABC), we can offer, for the first time, a united treatment for the behavior of both contour segments *and* contour tones across observed phonological patterns of harmony.

In this paper, we present a typological overview showing that contours can participate in harmony as units and as subsegmental phases. Table (2) provides representative examples:

(2)

Whole contour effect: all phases participate	Partial contour effect: some phases participate
a. Ngbaka nasal co-occurrence restrictions (Rose and Walker 2004): [^{m}bɛɛ̀^{m}bɛ] 'snail', [nɑnɛ̀] 'today'; *^{N}C…C, *C…^{N}C	b. Samala (Ineseño Chumash) sibilant harmony (Applegate 1972, Hansson 2001): /s-api-tʃ^{h}o-it/ → [ʃapitʃ^{h}olit] 'I have a stroke of good luck'
c. Changzhi whole contour tone copying (Yip 1989; Duanmu 1994): /kuə$_{213}$ -tə$^?_{535}$/→ [kuə$_{213}$ -tə$^?_{213}$], 'pan, dim.'	d. Hakha-Lai partial contour tone agreement (Hyman and VanBik 2002): /thlaâŋ + zuû/ → [thlaâŋ zuù] 'mountain beer'

In phase-based ABC, whole contour effects, as in (2a, c), are captured by correspondence at the segment level: CORR-segment. Because the vowel in Changzhi *kuə$_{213}$* is a unit, CORR-segment-V and IDENT-XX (tone) correctly predict the tonal contour assimilation that occurs in diminutivization (2c): /ku(ə$_2$ ə$_1$ ə$_3$)-t(ə$_5$ ə$_3$ ə$_5$)$^?$/→ ku(ə$_2$ ə$_1$ ə$_3$)$_i$ -t(ə$_2$ ə$_1$ ə$_3$)$_i$$^?$. Partial contour effects (e.g., (2b, d)) are captured by correspondence at the phase level: CORR-phase. In Hakha-Lai (2d), CORR-phase-V puts the last phase of the first vowel in correspondence with phases of the subsequent vowel. IDENT-XX (tone) forces agreement of Low tone across the phases in correspondence: /thla(á à à)ŋ zu(ú ù ù)/ → thla(á à à$_i$)ŋ zu(ù$_i$ ù ù). As in standard ABC, corresponding entities must meet a prescribed similarity threshold: e.g., both are vowels, sibilants, etc.

Autosegmental theory can handle some partial contour behavior but not whole contour behavior (e.g., Duanmu 1994). Standard ABC, with representations that go no deeper than the segment, easily handles whole contour behavior but has hitherto had serious trouble with partial contour patterns. In phase-based ABC, all segmental and tonal contours deconstruct into a series of simplex phases. Phase-based ABC provides a principled and functionally-motivated method for referencing subsegmental material in both segments and tone that does not rely on stipulating differences in featural representations and geometry, thus increasing the descriptive and explanatory adequacy of the theory.